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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
YANG, LINA	

ART UNIT	PAPER NUMBER
2665	

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/981,887	MARIAN ET AL.	
	Examiner	Art Unit	
	Lina Yang	2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/19/2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-9,11-19 and 21* is/are allowed.

6)☒ Claim(s) *10,20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 10 and 20 are objected to because of the following informalities:

The first time occurrence of the terminologies "LSP" and "LSP/FA-LSP", which are recited in each of independent claims 10 and 20, need to be clearly defined as what each term stands for. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 10 and 20 are rejected under 35 U.S.C. 112, second paragraph.

Claims 10 recites limitations: "...each node" and "...each packet". There are insufficient antecedent basis for those limitations in the claim.

Claim 20 recites limitation: "...each packet". There is insufficient antecedent basis for this limitation in the claim.

3. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: receiving a packet comprises LSP header from a previous node and forwarding the packet with new header to a next node.

4. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear that whether a method or an apparatus is being claimed in claim 20, since there are no clear method steps or means plus function recited in the claim. To be more specific, claim 20 provides for the use of "removing a previous LSP header and adding a new header containing a full LSP label for a current LSP/FA-LSP, and containing components identifiers which allow local identification of a hierarchy of LSP/FA-LSPs of which the current LSP/FA-LSP forms a part", but, since the claim does not set forth any steps involved in the method/process or means plus function forming the structure of the apparatus, it is unclear what method/process or apparatus that the applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

5. Regarding claims 10 and 20, due to the nature of 35 U.S.C. 112 second paragraph issue as indicated above, no prior art rejection can be applied at this time.

Allowable Subject Matter

6. Claims 1-9, 11-19 and 21 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter:

Claims 1-8 and 11 are allowable since prior art of record, in addition to other limitations recited in claims 1-8 and 11, dose not teach or suggest a packet routing/switching method comprising: defining a hierarchical plurality of label switched paths (LSP)/forwarding adjacency-label switched paths (FA-LSP) through a network of nodes from a lowest (least-nested) level to a highest (most-nested) level, each LSP/FA-LSP comprising a respective sequence of nodes comprising at least a source node and a destination node and possibly one or more transit nodes; to route/switch a packet flow from a first source node of said network of nodes to a first destination node of said network of nodes: a) maintaining at the first node a mapping between the packet flow and a first LSP of the hierarchical plurality of LSP/FA-LSPs defined between the first source node and the first destination node; b) at the first source node, for each packet of said packet flow, adding to the packet label switched routing information comprising an LSP label identifying the first LSP and sending the packet to subsequent node(s) in the sequence of nodes defined for the first LSP; c) at each node to which the packet is routed/switched other than said first Source node: i) if the node is a source node of a higher level FA-LSP than the LSP/FA-LSP identified by the LSP label of the packet, changing the LSP label in the label switched routing information to indicate the source node of the higher level FA-LSP, and including in the label switched routing information hierarchy information in respect of all lower level LSP/FA-LSPs in the hierarchy leading up to the higher level FA-LSP and forwarding the packet to the next node in the sequence of nodes defined for the higher level FA-LSP; ii) if the node is only a transit node, forwarding the packet to the next node in the sequence of nodes defined for the

LSP/FA-LSP identified by the LSP label; iii) if the node is a destination node of a higher level FA-LSP, changing the LSP label in the label switched routing information to indicate the source node of the next lower level LSP/FA-LSP indicated by the hierarchy information, and changing the hierarchy information to include only hierarchy information in respect of LSP/FA-LSPs in the hierarchy leading up to but not including the next lower level LSP/FA-LSP, and forwarding the packet to the next node in the sequence of nodes defined for the next lower level LSP/FA-LSP.

Claim 9 is allowable since prior art of record dose not teach or suggest a method to be executed at a node within a network of interconnected nodes within which a hierarchical plurality of LSP/FA-LSPs has been defined of performing label switching of packets having an LSP label and having a possibly empty components label, the method comprising: the node maintaining information for each LSP/FA-LSP comprising an LSP label, an identification of a source node, transit nodes if any, and a destination node, and for each LSP/FA-LSP an identification of all possible next lowest level LSP/FA-LSPs which may use the LSP/FA-LSP; the node obtaining the LSP label, the LSP label defining a current LSP/FA-LSP of a packet to be routed; the node obtaining the components label of the packet; the node looking up the information for the current LSP/FA-LSP; in the event the node is a source node of a next higher level FA-LSP of which the current LSP/FA-LSP forms a component, switching the LSP label to contain the label of the next higher level FA-LSP which is used by the current LSP/FA-LSP, and adding to the components label to include in an additional component identifier an

identifier of the current LSP/FA-LSP; in the event the node is the destination node of the current LSP/FA-LSP, determining from the components label and the maintained information another LSP label for a lower level LSP/FA-LSP from a component identifier for the lower level and removing the component identifier for the lower level from the components label, and changing the LSP label to the another LSP label for the lower level hierarchy determined from the components label; the node re-applying the components label to the packet; the node re-applying the LSP label to the packet; and the node changing an output interface such that the packet is forwarded to an appropriate next node.

Claims 12-19 are allowable since prior art of record, in addition to other limitations recited in claims 12-19, dose not teach or suggest a packet routing/switching system comprising: a network of interconnected nodes through which is defined a hierarchical plurality of label switched paths (LSP)/forwarding adjacency-label switched paths (FA-LSP) from a lowest (least-nested) level in which LSPs are defined between edge nodes of the network to a highest (most-nested) level, each LSP/FA-LSP comprising a respective sequence of nodes comprising at least a source node and a destination node and possibly one or more transit nodes; wherein each edge node is adapted to maintain a mapping between each packet flow entering the network at the edge node and a respective first LSP of the hierarchical plurality of LSP/FA-LSPs defined between the edge node and a destination node in the network for the packet flow; wherein each edge node is further adapted to add to each packet of a given

packet flow switched routing information comprising an LSP label identifying the respective first LSP to which the packet flow is mapped and to send the packet to subsequent node(s) in the sequence of nodes defined for the respective first LSP; wherein each node other than an edge node is adapted to perform label switching by: i) if the node is a source node of a higher level FA-LSP than the LSP/FA-LSP identified by the LSP label of the packet, changing the LSP label in the label switched routing information to indicate the source node of the higher level FA-LSP, and including in the label switched routing information hierarchy information in respect of all lower level LSP/FA-LSPs in the hierarchy leading up to the higher level FA-LSP and forwarding the packet to the next node in the sequence of nodes defined for the higher level FA-LSP; ii) if the node is only a transit node, forwarding the packet to the next node in the sequence of nodes defined for the LSP/FA-LSP identified by the LSP label; iii) if the node is a destination node of a higher level FA-LSP, changing the LSP label in the label switched routing information to indicate the source node of the next lower level LSP/FA-LSP indicated by the hierarchy information, and changing the hierarchy information to include only hierarchy information in respect of LSP/FA-LSPs in the hierarchy leading up to but not including the next lower level LSP/FA-LSP, and forwarding the packet to the next node in the sequence of nodes defined for the next lower level LSP/FA-LSP.

Claim 21 is allowable since prior art of record dose not teach or suggest a network node within a network of interconnected nodes within which a hierarchical plurality of LSP/FA-LSPs has been defined, the network node comprising: a network

information repository comprising for each LSP/FA-LSP an LSP label, an identification of a source node, transit nodes if any, and a destination node, and for each LSP/FA-LSP an identification of all possible next lowest level LSP/FA-LSPs which may use the LSP/FA-LSP; a packet router adapted to route each packet by: obtaining an LSP label of the packet, the LSP label defining a current LSP/FA-LSP of the packet; obtaining a components label of the packet; looking up the information in the network information repository for the current LSP/FA-LSP; in the event the node is a source node of a next higher level FA-LSP of which the current LSP/FA-LSP forms a component, switching the LSP label to contain the label of the next higher level FA-LSP which is used by the current LSP/FA-LSP, and adding to the components label to include in an additional component identifier an identifier of the current LSP/FA-LSP; in the event the node is the destination node of the current LSP/FA-LSP, determining from the components label and the maintained information another LSP label for a lower level LSP/FA-LSP from a component identifier for the lower level and removing the component identifier for the lower level from the components label, and changing the LSP label to the another LSP label for the lower level hierarchy determined from the components label; re-applying the components label to the packet; re-applying the LSP label to the packet; and changing an output interface such that the packet is forwarded to an appropriate next node.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kasvand-Harris et al. (US Patent Application No. 20020172155 A1) discloses a method and system for allocating and controlling labels in multi-protocol label switched networks. Carpini et al. (U.S. Patent Application No. 20030043792 A1) teaches a method of conditioning the network and a method of data transmission in a label switched communication network. Kokkonen (US Patent Application No. 20040057424 A1) discloses a communication system for transferring data packets between networks. The headers of each of said data packets are encapsulated by assigning at least one label by an ingress node, so that the data packets can be forwarded by each of the intermediate nodes based on said label without having to process the header information.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lina Yang whose telephone number is (571) 272-3151. The examiner can normally be reached on Monday-Friday (8:00am-6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LY

ALPUS H. HSU
PRIMARY EXAMINER